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FIFTY-EIGHTH YEAR

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Whole No. 3013.

NEW YORK, MONDAY, JULY 3, 1916.

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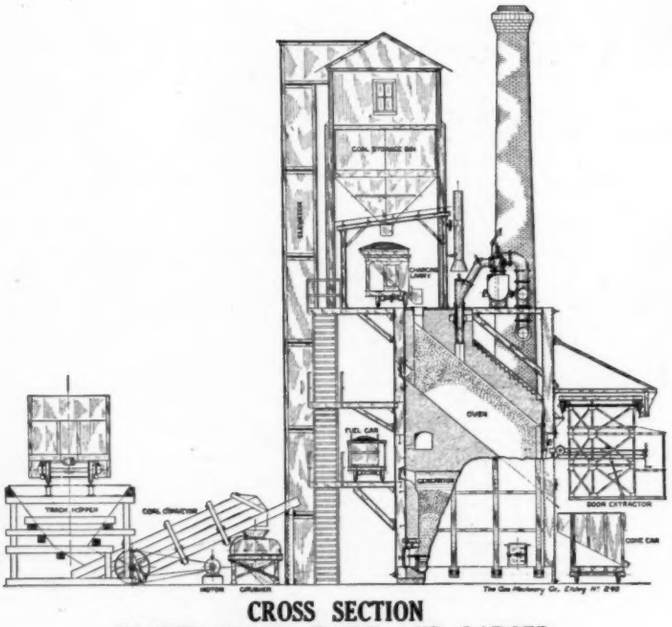

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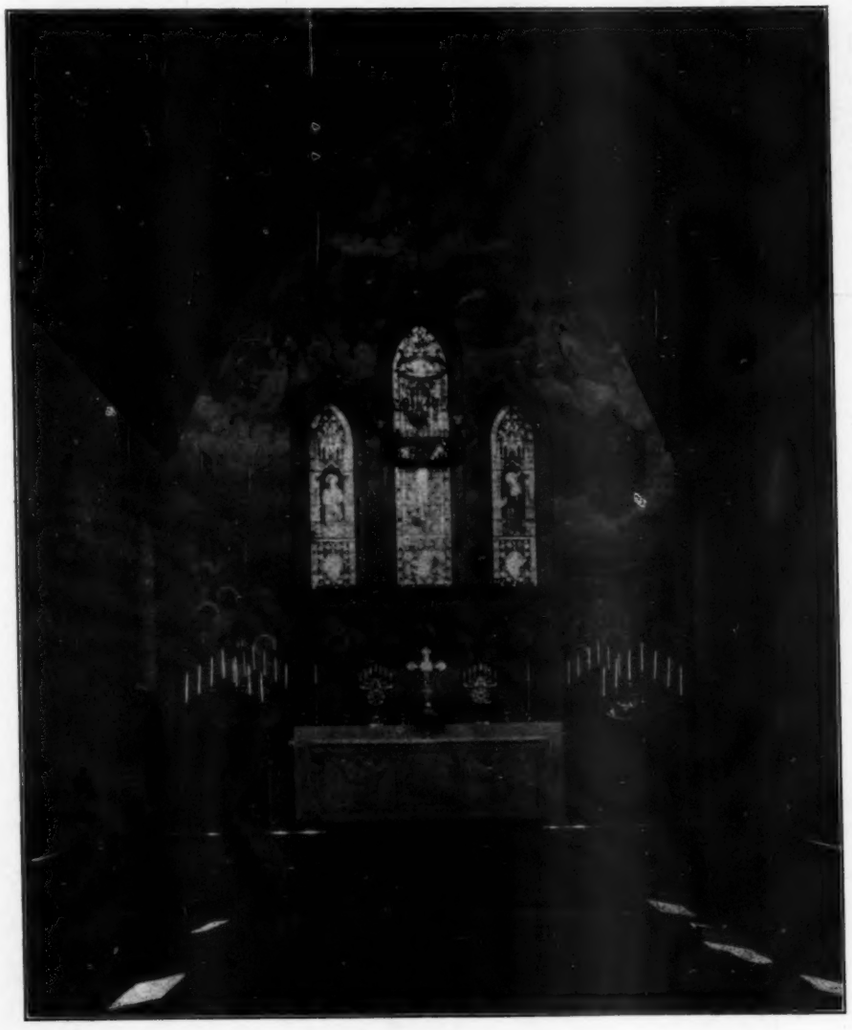
GAS LIGHT JOURNAL

VOL. CV., No. 1. NEW YORK, JULY 3, 1916. WHOLE No. 3,043.

Lighting a Mural Painting in St. Thomas Episcopal Church, Whitemarsh, Pa.

ROBERT FFRENCH PIERCE.

There are few problems in illumination more complex than those arising out of the lighting of mural paintings, and none are less amendable to the methods of predetermination, which are often adequate in other classes of illumination. Unlike the painting hung on the wall, the mural painting may seldom be fitted with its own lighting accessories, integral with it. The former may, if in a gallery, be illuminated by means of a lamp and reflector attached to the frame, and even in the home the jarring note introduced by this extraneous and undecorative device is not very objectionable. The painting is hung with the obvious intention of commanding the concentrated attention of the observer, and any necessary means to this end, however unbeautiful in themselves, are permissible because they need not distract attention from the picture itself.



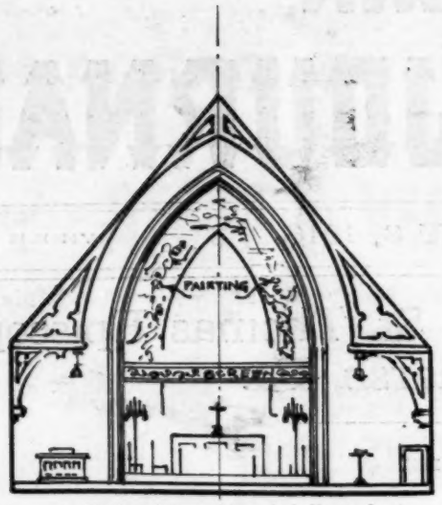
Gas Illuminated, Mural Painting and Altar.

In the case of the mural painting, however, the canvas is not merely a thing of beauty to be enjoyed or ignored at the pleasure of the observer, but a part of the inescapable atmosphere of the interior, to be felt rather than to be inspected. Even if it were aesthetically permissible to surround mural paintings with the usual picture-lighting reflectors, the result would usually be far from satisfactory because of the considerable dimensions of the picture which would make uniformity of illumination extremely difficult if not altogether impossible of achievement.

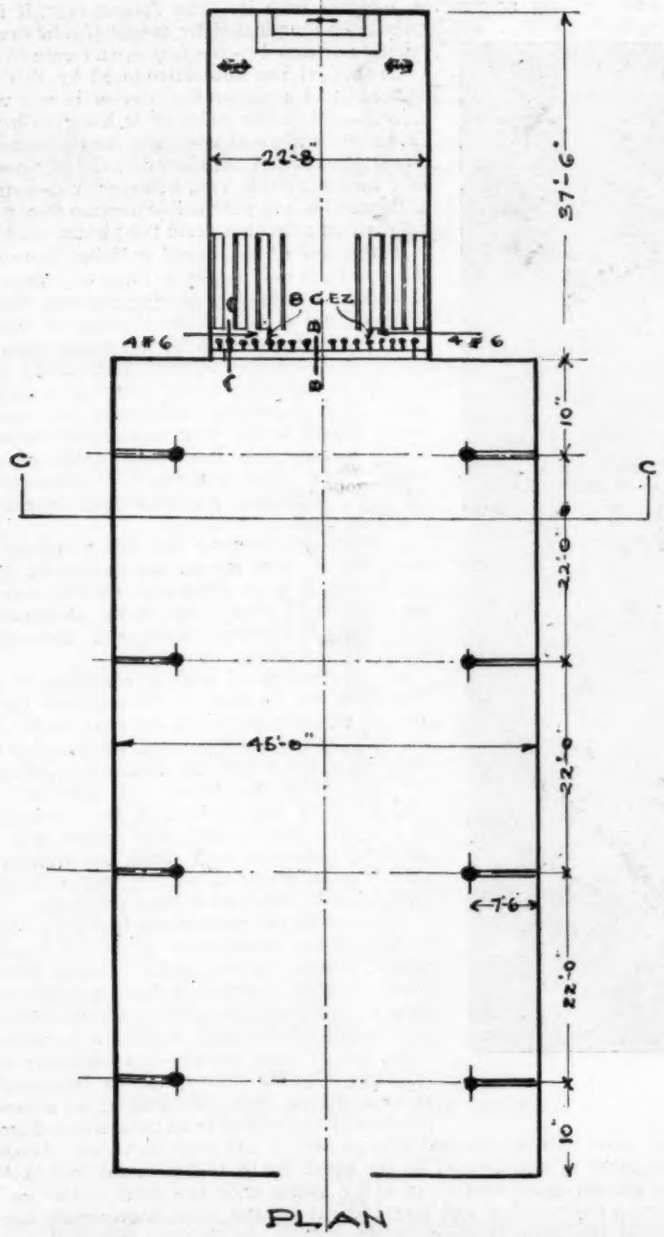
It sometimes happens that the problems encountered in these special applications of light can be solved in an altogether obvious way by the simplest of means, due to the existence of architectural features that lend themselves readily to the proper solution.

An illustration of such a condition is the Church of St. Thomas at Whitemarsh, Pa., a plan of which is shown on the next page. On the wall back of the altar, and surrounding the windows at the end of the chancel is a painting by Miss Mary A. Sloane, representing the Descent from the Cross and the Ascension. It fills the entire wall, and there are no positions near the wall itself for concealing light sources, except in such a way as to produce tell-tale evidences of their existence.

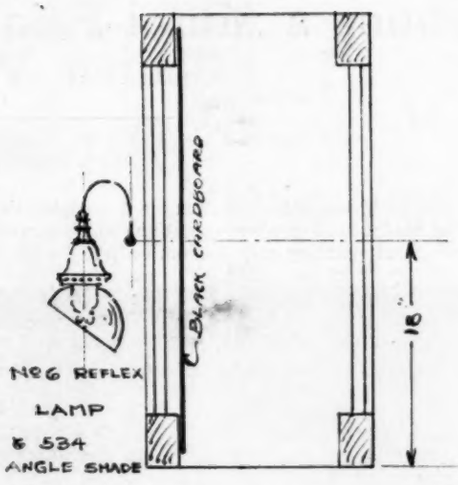
Fortunately the rood-screen (see cut on page 3) offered a satisfactory place of concealment for the lighting units. It was feared, however, that specular reflection might produce an annoying glare from certain positions, particularly if focussing reflectors were used. Then, too, at this distance—and especially with reflectors of wide distribution—a considerable amount of stray light, illuminating the adjacent portions of the ceiling to an undesirable degree, was to be expected. Fortunately the ceiling was of varnished dark wood, which absorbed a large part of the stray light, and directed most of the remainder toward the painting. Under the circumstances it was decided to try eight No. 6 Reflex lamps with a No. 445 angle reflector to illuminate the lower portion of the painting and an equal number of C.E-Z lamps with the same reflectors inverted to light the upper portion. These groups were placed respectively below and above a run of gas pipe transversely across the middle of the back of the rood-screen. (The arrangement of the lamps is shown in the plan of the church, section A-A and



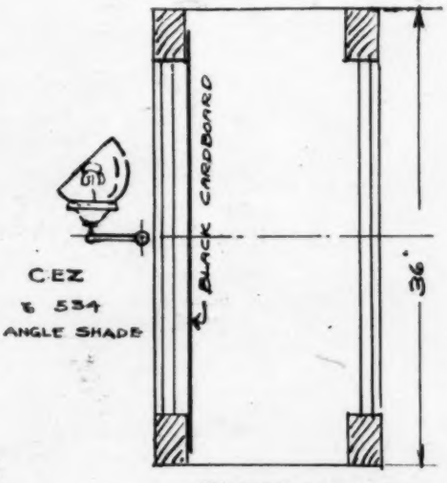
SECTION C-C



PLAN

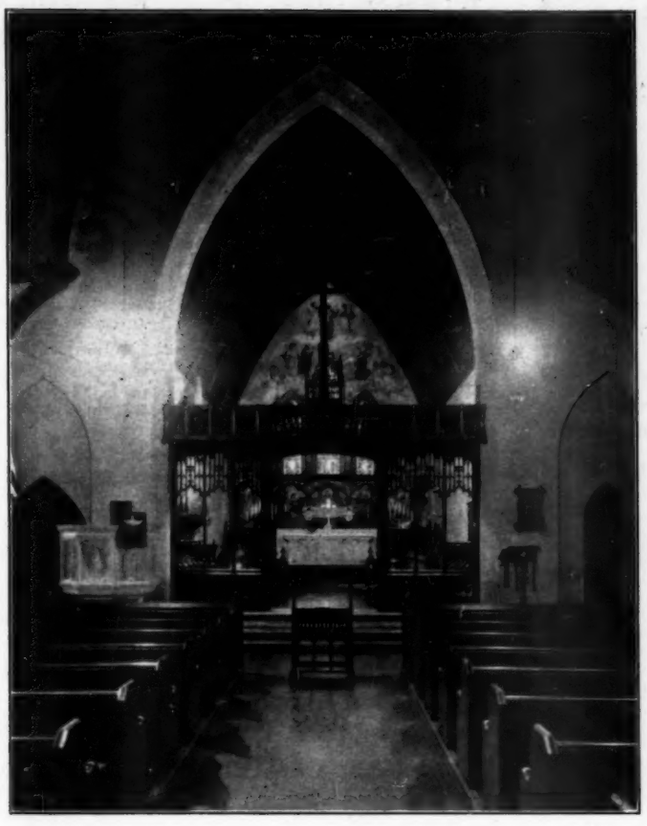


SECTION A-A



SECTION B-B

LIGHTING PLAN FOR ST. THOMAS CHURCH WHITEMARSH PA.



Looking Toward the Choir.
The Reflex Lights are Behind the Rood Screen.

Looking Toward Body of Church.
Showing Location of Lamps on Screen.

B-B; and the appearance of the installation in cut opposite.) It will be noted that there is sufficient light in the lower portion of the distribution from the Reflex lamps to adequately illuminate the choir.

The illustration on page one, is reproduced from a photograph taken from a point just inside the rood-screen, and made by the light of the gas lamps (the small amount of daylight entering through the stained glass window being negligible) and shows the very satisfactory distribution of the artificial illumination. There is no evidence of the direction from which the light comes and no glare on the painting. The two other photographs are a view of the chancel from the middle of the church, showing the effect of concealing the lamps by means of the black cardboard screens, and one taken from a point just in front of the altar, looking toward the rood-screen. From this point, of course, a very short exposure was made on account of the glare from bare mantles.

The illumination having proved satisfactory as far as intensity and distribution of light was concereed, the artist and the committee of ladies that presented the painting to the church, were asked to pass upon the question of color values. They had been assured that any reasonable modification in the color of light could be obtained by special mantles having the required ceria content, as there had been some misgivings expressed concerning the values of the colors under artificial light. After inspection of the results there were no criticisms and the installation was accepted as made. While the photographs do not, of course, represent color values satisfactorily, the manner in which details of chiaroscuro and drawing are reproduced indicates that the color values suffered little modification as far as their effect upon the harmony and "feeling" of the whole is concerned. This is probably due to the fact that unsaturated colors were used in the painting. Purer colors would undoubtedly have undergone greater modification.

The satisfaction evinced by the committee is all the more gratifying in that the congregation is composed of persons accustomed to passing judgment upon works of art.

St. Thomas Church is located in a district containing many of the fine country places, for which the suburbs of Philadelphia are noted, and it was to be expected that the result obtained in this installation would be subjected to discrimating criticism. The approval with which the installation has met is therefore particularly significant of the suitability of the system for meeting the aesthetic requirements.

It is desired to acknowledge the interest and activity of Mr. G. N. Rogers, Superintendent of the Philadelphia Suburban Gas and Electric Company at Ambler, who is responsible for the writer's opportunity to meet this particularly interesting problem, and who superintended the installation of the equipment. It is also a pleasure to express appreciation of the kindness of Mrs. J. Waln Vaux, Chairman of the Ladies Committee, who permitted the photographic reproductions of the completed work.

The Sulphuric Acid Industry in 1915.

The production of sulphuric acid in the United States in 1915 was 3,868,152 short tons, expressed in terms of 50° acid, valued at $29,869,080, and there was an output of 189,795 short tons of fuming acid of different strengths, valued at $2,787,971, making a total of 4,057,947 short tons, valued at $32,657,051.

The total production is an increase as compared with 1914, due to an increase in the production of acid of the stronger grades—60° and higher. The output of by-product acid in 1915 also showed an increase as compared with 1914. The manufacture of this stronger acid is becoming more important, owing to the demand from the explosives and war munitions industries, and in the statistics for 1915, for the first time, this acid is classified separately. The price of sulphuric acid varied widely during 1915. Producers who had previously entered into long-time contracts sold acid at prices below those now current, especially during the last part of the year. The trade in strong acids was active, on account of the demand from the explosives and war munitions industries, but this demand came only after the first quarter of the year and was very strong only during the last half. Before that time some acid plants were shut down. Average values are therefore much below those that ruled on the market at the close of the year.

How the Gas Company and the Architect can Co-operate.

Address to the N. C. G. A. Mid-Year Conference by D. K. BOYD.

I naturally approach this subject of co-operation from the standpoint of the architect, and will suggest what you may do to assist us, leaving it to those who may take part in the discussion to tell us in what respect the architects may assist you in accomplishing the results for which we are both aiming; the service of the public.

Architects, unfortunately, are not familiar with all that you have been doing in rendering service to owners and occupants of buildings. This is largely because you have not informed them. Architects ought to welcome your co-operation in securing for the owners of buildings and all occupants the fullest return for the investment and the greatest amount of comfort and convenience. It is true, however, that large buildings, and others also, are erected without provision for gas. My feeling is that the architects and owners of these buildings have done themselves an injustice, due, I should say, to a lack of foresight and of knowledge of the uses to which gas may be put.

You must not overlook the fact that your commodity is but one of a countless number of mediums with which an architect must deal. Do you realize what a task this imposes? The very first thing you could do in this direction is to make our task lighter by furnishing us information of the installations necessary to make your product available for every possible use.

This is the age of co-operation and of nationalization. You represent a great national industry and you ask our co-operation in utilizing its products to the greatest advantage of all. It ought to be very simple. We agree to co-operate and we ask you to furnish the information. But before I suggest ways in which you can assist us, individually and collectively, I ought, perhaps, to tell you of some of the practical activities of the American Institute of Architects.

For years the Committee on Contracts and Specifications has been working to perfect the general conditions and standardize documents affecting the relations of architects, owners and contractors; and finally, with the active co-operation of the National Association of Builders' Exchanges and other organizations, adopted the "Standard Documents," hailed by all parties interested as a great step in the right direction. Some years ago the Institute had a committee to confer with the National Association of Steam and Hot Water Fitters, resulting in better understanding and a recommendation that contracts for these branches and for plumbing and electrical work be entered into independent of the building contract. The Institute now has a special committee, appointed at the request of the U. S. Bureau of Standards, to confer with its engineers in the preparation of a National Gas Safety Code. Your Association, the American Gas Institute, and other interested bodies, are co-operating with the government in this painstaking work. The Institute's interest in practical matters so vitally affecting the practice of the profession and so long overlooked, has finally culminated in the creation of a Committee on Materials and Methods. So you will note that we are, through our own National body, lacking neither in organization nor interest in matters where it is possible for us to co-operate with other bodies. And with you our interests coincide, for you cannot give full service in the utilization of your product unless we, representing the best interests of our client, furnish him with every known means for its consumption and use under the most efficient and economical conditions of installation.

At the beginning of this paper, I said that the first and most necessary step is: that you furnish us with information as to methods of installation for the piping of gas in all buildings. What form can this information take?

I would place at the very head of the list: a "National Electrical Code" in the gas industry. That is a misnomer, of course, but it will illustrate to you what I mean; namely, one dominant controlling factor in the installation of the arteries of service.

As you know, it took years to develop the National Electrical Code, and the following bodies were officially represented:

American Institute of Architects.
American Institute of Electrical Engineers.
American Society of Mechanical Engineers.
American Institute of Mining Engineers.
American Street and Interurban Railway Association.
Associated Factory Mutual Fire Insurance Companies.
Association of Edison Illuminating Companies.
International Association of Municipal Electricians.
National Board of Fire Underwriters.
National Electric Light Association
National Electrical Contractors' Association.
National Electrical Inspectors' Association.
Underwriters' National Electric Association.
National Fire Protection Association.

I mention these to show the diverse interests represented in formulating standards of as great importance to the electric companies as standards of piping are to the gas companies. Among them, you will note, was the American Institute of Architects—this was another and an early activity of the Institute to which I did not previously refer.

As a code or any method of procedure that does not provide a penalty for its non-observance is not observed as it should be, there is a powerful agency operating for the enforcement of the Electrical Code. This coercive force lies in the certificate of approval which the code's observance secures from the Board of Underwriters, without which certificate the fire insurance companies will not issue policies. As such policies form a basis of all financing, the situation is pretty well controlled—for electricity. The modern architect incorporates in his specification for electrical work such a clause as: "all work must be done in conformity with the National Electrical Code and subject to the inspection and approval of the local Board of Underwriters, whose certificate must be furnished before final payment will be made." This clause insures co-operation throughout—it means that the architect, whether or not he employs a consulting or electrical engineer, has a basic specification for the essentials of an installation, prepared by a group of organizations whose authority is not questioned. It means that the materials entering into the installation have had inspection as to quality, and that the workmanship that incorporates them into the structure is scrutinized—all by representatives of associations with national affiliations—a combined service of protection to architects, owners, builders, the electric and insurance companies and all occupants. No architect objects to using the results of the judgment and combined experience of these authorities instead of attempting to compile a specification of his own. He does not consider this an intrusion upon his domain—but welcomes it as a valuable assistance.

To much reliance on the assistance of others, however, would beget laxity if architects felt that these combined creative and inspection forces relieved them of their duty to their clients, and to reputable manufacturers and contractors in not seeing to it that all requirements are fulfilled to a nicety and not merely to pass any code or perfunctory inspection. For, unfortunately, with many architects and owners, wire is wire, and conduit is conduit, just as with so many, pipe is pipe in gas fitting, and not enough differentiation is made between good and indifferent workmanship, if it will pass the test.

More and more frequently, however, a distinction is made as to quality in materials of building construction, and stronger encouragement is given to those manufacturers who, in spite of rigid competition, adhere to their standards and make names for themselves under established brands. By conducting an educational campaign along these lines you will oblige architects to use names, brands and standards of quality in their specification requirements, which will assist them and reputable contractors in furnishing owners with the best the market affords—when that is what they are paying for. Why not let us co-operate to get rid of the words in specifications which say, but do not mean, "very best quality," and the "or equal," in favor of calling for the brands, thickness and weight of pipes, or what not, by the several names, that will be acceptable?

But returning to the National Code, and comparing the situation in the electrical field with that in the gas field. What does the modern architect say in calling for a gas installation—when he calls for it at all? Many of them probably include a clause like this in their specification (which may be nearly all that is said on the subject): "Pipe the building for gas throughout to all outlets shown or necessary, using pipes of very best quality and of sufficient size to give all outlets a full head of gas at each burner. Pipes intended for fuel or other appliances as indicated to be of proper size to approval. Leave all work tight and guarantee re-

sults to the satisfaction of the architect." Or, if he knows the gas company, the specifications may be varied to read: "Pipe the building for gas to the outlets indicated in accordance with the sizes and arrangement directed by the local company and subject to their test and final approval."

Here we have a striking difference. In the one case, the architect has the combined experience of all interests in the electrical field, a national standard of proceedure, known to all—and in the other case, relying upon the varying judgment of a plumber, or the unknown directions of the local gas company. Some architects may not like to have the case put so badly, when they so carefully state that the work "is to be done to the satisfaction of the architect," but, after all, are not these the facts?

Aside from all other considerations it is not fair to the plumber or gas fitter, nor to the local company, to place so much responsibility upon them. In fact, there is a distinct disadvantage to the reputable gas fitter under this system, when contracts are awarded on the competive basis—for does not the man who can figure upon the smallest sizes of pipes or take the greatest chances on condensation and lack of flow, usually land the work by virtue of submitting the lowest estimate? Unfortunately this is all too true. This refers to cases where there is no adequate local company requirements or inspection. You must look ahead, for the buildings in outlying districts might just as well be piped before your mains get there.

A National Basic Code with a piping schedule of minimum standards for sizes, lengths and weights would, therefore, work to the great advantage of all good plumbers and contractors, who would be enabled to estimate under stable and equable conditions and to install their work without being at the mercy of varying individual judgment as to "proper sizes," etc. The piping schedule that your Association has adopted and has registered in Sweet's Catalogue, is a step in the right direction. I feel very much honored to have had, as the Consulting Architect on Sweet's Catalogue Service, a hand in its preparation, and I hope that it may be taken up and criticised by the American Gas Institute, the American Institute of Architects and all other interested bodies, and later adopted. But even as it is, if put to use by all architects and others to whom it is available, it will be of incalculable assistance and value, for it may now be written into specifications somewhat in this fashion (and I ask you to compare this with the conjectural, haphazard form before mentioned):

"The building is to be piped throughout for gas, to the openings and in the manner indicated on drawings, all piping to be in accordance with the Standard Piping Schedule, and accompanying description of the National Commercial Gas Association, as printed on pages 1290 and 1291 of Sweet's Architectural Catalogue, 11th Edition, except in so far as any statutes or locality ordinances or rules of company supplying gas may change same, in which case the specifications as so changed shall be followed, and they, together with all materials and workmanship, shall also be subject to approval of the architect. All piping shall be subject to the tests and approval of local inspectors having jurisdiction, or to the approval of the architect or his representative, if there is no gas company in the field." Then should follow provision for the companies' service and connections to meters, or meter, etc., and, of course, the pipes and other materials should be mentioned by name. By following your standards as rapidly as developed, architects can assist you in their adoption.

In connection with your piping schedule, or basic requirements, emphasis should be laid on the weight and quality of the pipe and fittings and of the methods of making threaded joints permanently tight, etc. These requirements should be incorporated as soon as may be, and, if it is within the range of possibility, you should, it seems to me, make some arrangements for the testing of pipe and appliances and the issuing of labels similar to those included within the service of the Underwriters' Laboratories, Incorporated. Many of these matters will be covered by the Bureau of Standards in its National Gas Safety Code, but it will take a long time to perfect that code. Do not wait for the Government to do it, but assist it by adopting your own code first and let the Government have it as a basis to work upon and perfect as it is doing, I understand, with the National Electrical Code.

In certain sections many of the difficulties I have mentioned do not, of course, obtain, even at the present time. In Philadelphia territory, for instance, an ideal condition prevails. The U. G. I. Co. is vested, by ordinance of councils, with authority to require proper and safe installation. I quote from the specifications for house piping issued by that company, as follows:

"The ordinance of November 12, 1897, which authorizes the United Gas Improvement Company to lease the Philadelphia Gas Works, requires the company to exercise a supervision over the character of the material used and the work done by fitters in piping houses for gas and in hanging fixtures."

"In accordance with the obligation thus created, the company hereby adopts the following rules and specifications, which must be complied with before the company is warranted in admitting gas."

You can readily see what a relief and assistance it has been to the architects in the Philadelphia territory to adopt this specification. It was to give architects throughout the country a similar convenience and to insure to all owners compliance with the best practice in the piping of their buildings that lead me to suggest to your Association the adoption of your present piping schedule, and its publication in Sweet's.

As to the requirements of individual companies—it ought to go without saying that their chief interest in the piping of buildings for gas is to see that the occupants of the buildings get the most satisfactory results from the use of gas. Nothing is worse for any service—especially a public utility—than to have dissatisfied users. Any company that does not best serve the interests of its consumers does not serve its own best interests. Here is a case in point: A few years ago I designed a number of small dwellings for a community in Virginia, which were erected by a contractor from the suburbs of Philadelphia, with sub-contractors from the same section. My specifications, among other things, called for each building to be piped for gas and the work to be done in full accordance with the Book of Rules of the U. G. I. and as if to pass their inspection and approval as to sizes and arrangement, etc., complete. When the northern plumber arrived to perform his contract, in the first building erected, the neighbors said: "You are surely not going to pipe buildings for gas here! Why the people around here don't use gas for lighting any more—they can't get any light out of it." Before starting his work he examined some of the nearby houses and found the reason—all pipes so small that it was no wonder they could not get satisfactory results. He piped the buildings according to U. G. I. standards and I have never heard any complaint from that quarter. And yet, if local capital and local talent had built that settlement it is safe to say that electricity would have been the only illuminant—instead of *both*.

This finishes my first suggestion, and the principal one as to the information we need. If we agree that this is the first step in a program of co-operation, what other information can you furnish? I would place next, detailed drawings or diagrams of typical features of installations and of connection to appliances.

A prominent New York architect, in regretting that he could not be present to-day, added:

"I have really no definite suggestions to make. * * * If the gas companies want to get the architects interested in the proper way in which gas piping is to be done and the usefulness of gas as an adjunct of modern building, they ought to go about it in a business-like way. I would suggest some scheme of standard construction sheets, as I have already suggested to fire prevention organizations. That they get out a series of diagrams and send them to every architect in the country, showing the proper arrangement, sizes, etc., of the pipe around the meter and throughout small houses: and similar diagrams for a city residence, and again for connections of various desirable residential apparatus.

"That the gas companies in this part of the country are not doing what might be done in this direction was evidenced to me recently. I happened to be in the basement of a house in a large Ohio city, with its owner, and saw a little thermostatic gas control valve on the hot water apparatus that I had never seen before. It was an admirable device. I got one from the manufacturer and had it installed in my own house. I had to get instructions as to the method of installation from the manufacturer—my plumber had never seen one before. Since that time this well known plumber in New York has come to me and asked whether I would recommend this apparatus for a residence he was doing elsewhere in the city. I am sure that if the architects of New York could see this thermostatic controlling valve arrangement they would install gas water heating apparatus in thousands of buildings which now have no such apparatus."

The matter of heating water is a great bug-bear with architects. And whom should we look to but you for information? A committee from your Association on which could be represented manufacturers of these appliances, should formulate standards of practice. As a beginning, give us a statement of what *not* to do in trying to heat water—so that gas water heaters will not be blamed. And in relation to almost every room appliance—what could make their use more universal than the introduction of "Concealo" plates as a feature of all installations. Tell us more about this little article and its many advantages.

Then, after you have done these things and have made it easier

for architects to include gas piping as a feature of construction of every building by furnishing them with basic standards for complete installations, and after giving them data on connections and appliances, consider this as my next suggestion in our campaign of co-operation: Send architects abstracts of the results of those deliberations in which they would be intesested. Do not limit the distribution of your final decisions or the results of your deliberations to your own membership—see that their circulation is constantly increased. You will find many willing, even anxious, listeners among those in the distance, whom you may have thought uninterested. It is a fault not peculiar to your Association, but existing in nearly all professional, technical and commercial bodies, that they are apt to keep too closely the results of their proceedings. "Let your light so shine that all men may know your good works," is a familiar quotation and a precept you might well observe.

Take as an illustration the report or the Committee on Piping Large Buildings for Gas, submitted to the American Gas Institute in 1914. It is full of information, statistics and suggestions valuable to architects. But it is too long for them to read, and too large, and, I dare say, costly to send to them. But what has ever been done to make a digest of it and place that before architects? How many architects even know that such a committee was or is in existence? A few do, for some have lately been visited and asked to write letters saying that they consider it very desirable to pipe large buildings for gas. You ought to write architects telling them what your committee thinks about the desirability, nay, even necessity, of so doing, and give them reasons therefore—arguments that they can use with their clients. You will, I think, find that many gas installations that are omitted were included in the architects' recommendations to the owner and stricken out by the latter on the mistaken plea of economy. I mention this as one reason—but not as an excuse for those architects who do not or will not keep abreast of developments in the art and science of building construction and equipment. But the owner is the one who spends the money, not the architect, so in your co-operation with the architect you ought to furnish him with data to use in his arguments. Mention by name a large building recently erected in one of our big cities where costly alterations had to be made to accommodate a tenant who otherwise would not have rented an entire story, and so on.

Take your publication "A Thousand Uses for Gas;" an excellent book and of great value for suggestions. Why not extract from it about fifty-seven varieties of the most usable and necessary types and address architects about them especially?

I am afraid my remarks have been merely suggestive rather than constructive. But, after all, that is a matter for later development. Having made several recommendations concerning information, let me offer one other in closing. At the same time I want to compliment you upon the excellent courses of instruction you are conducting among gas company employees. It indicates a fine spirit and is typical of the modern ideal of service. But can you not go further, and in that way still better co-operate with the architects? Can you not have a special or a post-graduate course to turn out consulting gas engineers? Can you not offer to the architects a companion to the electrical engineer—one whom architects may employ in the same capacity and on the same basis to develop gas installations—without affiliations with any one company? Or can you not use some means to encourage on the part of the consulting engineers who now lay out electrical installations a knowledge and appreciation of the value and advantage of gas installations for light, fuel and power, so that he too may co-operate with the rest of us? With that thought I conclude my paper, thanking you greatly for the opportunity you have given me to present it, and expressing the hope that the discussion which may follow will bring us at least one step nearer to that co-operation which will help not only the architects and the gas companies, but the owners and occupants of all buildings erected and to be erected in this country.

English Glassware for the Lighting Industry.

By J. S. Dow.

A very interesting discussion on this subject took place at the last meeting of the Illumnating Engineering Society in London, when a paper was read by Mr. S. B. Langlands, Lighting Inspector to the Glasgow Corporation. The outbreak of war has brought the question of glassware to the front in England, and manufacturers are now trying to produce many special kinds of glass hitherto imported; in particular the question of producing heat-resisting glassware, suitable for incandescent burners as globes and chimneys, and for the high pressure gas lamps widely used in the streets of London. The heat developed in such lamps is considerable, and an exceptionally good variety of glass is needed to withstand the strain of changes in temperature.

Glass for globes and chimneys should fulfill the following requirements: It must be (a) suitably transparent, (b) colorless, (c) capable of withstanding heat, (d) must be durable and must retain its transparency in use.

Many glasses that have good heat-resisting power, tend to "fog" in course of time, and this is ascribed by Mr. Langlands mainly to the use of lead. In the heat-resisting Jena glass, no lead is used.

In the course of the discussion some remarks were made by members of the recently constituted Glass Research Committee of the Institute of Chemistry, which, since the war began, has done remarkable work in ascertaining the formulae for many special kinds of glass used for chemical and laboratory work; a great deal of glass of this kind, formerly imported, now being made in England. It is hoped that similar efforts will solve the various problems in connection with glassware used in the lighting industry.

Another point that received much attention in this discussion was the need for standardizing the dimensions of globes. There are at present an extraordinary variety of globes, bulbs and chimneys made for the lighting industry, and it is suggested that if glass makers and representatives of the lighting industry could co-operate and decide on a series of dimensions that are satisfactory in practice, the probleme of manufacture in large quantities would be much simpler.

But not only the size of articles, but the constitution of the glass needs to be standardized. For example, a great variety of so-called opal globes and shades are being made, but their qualities differ very much; in some cases the light is successfully diffused with small absorption, in others a great deal of light is needlessly lost or the glass is not uniform in respect of color and translucency.

Among other special varieties of glass of interest in the lighting industry are the special colored glasses used for the production of "artificial daylight." Here again different qualities of glass are being made for producing artificial daylight from electric tungsten lamps, incandescent gas mantles, etc.; and it is obviously desirable that a particular, exact and reproducible glass should be determined for use with each illuminant so that the quality of "artificial daylight" may be maintained constant.

Reference was also made to the difficulty of securing standard neutral glass plates, to absorb a given percentage of light, for use with photometric and other optical instruments.

Wrapped up with the whole subject is the question of estimating and specifying the value, from a lighting standpoint, of various types of globes and reflectors. In the case of globes one can state such points as the efficiency with which the light is diffused, and the quantity of light absorbed. But in the case of reflectors it is not enough to state *only* the percentage of light absorbed, without considering the percentage of the total flux of light enclosed by the reflector. For example, a very shallow reflector, placed a long way from the light, might absorb very little light, merely because only a small portion of the total flux of light was intercepted. It might have a low absorption, but nevertheless be a very bad reflector. In deciding on standard lines of globes and reflectors, therefore, it is essential to bear in mind both the manufacturer's problems and the question of securing good conditions from the lighting standpoint. Mr. Longlands concluded his paper by the following concise suggestions:

(1) There is a need for standardization in respect of materials used in making the various kinds of glassware used in the lighting industry, It would be very helpful for a complete series of samples to be prepared, attached to each being particulars of the chemical compositian, absorbing and diffusing qualities, color, permanence and durabibility, and special applications.

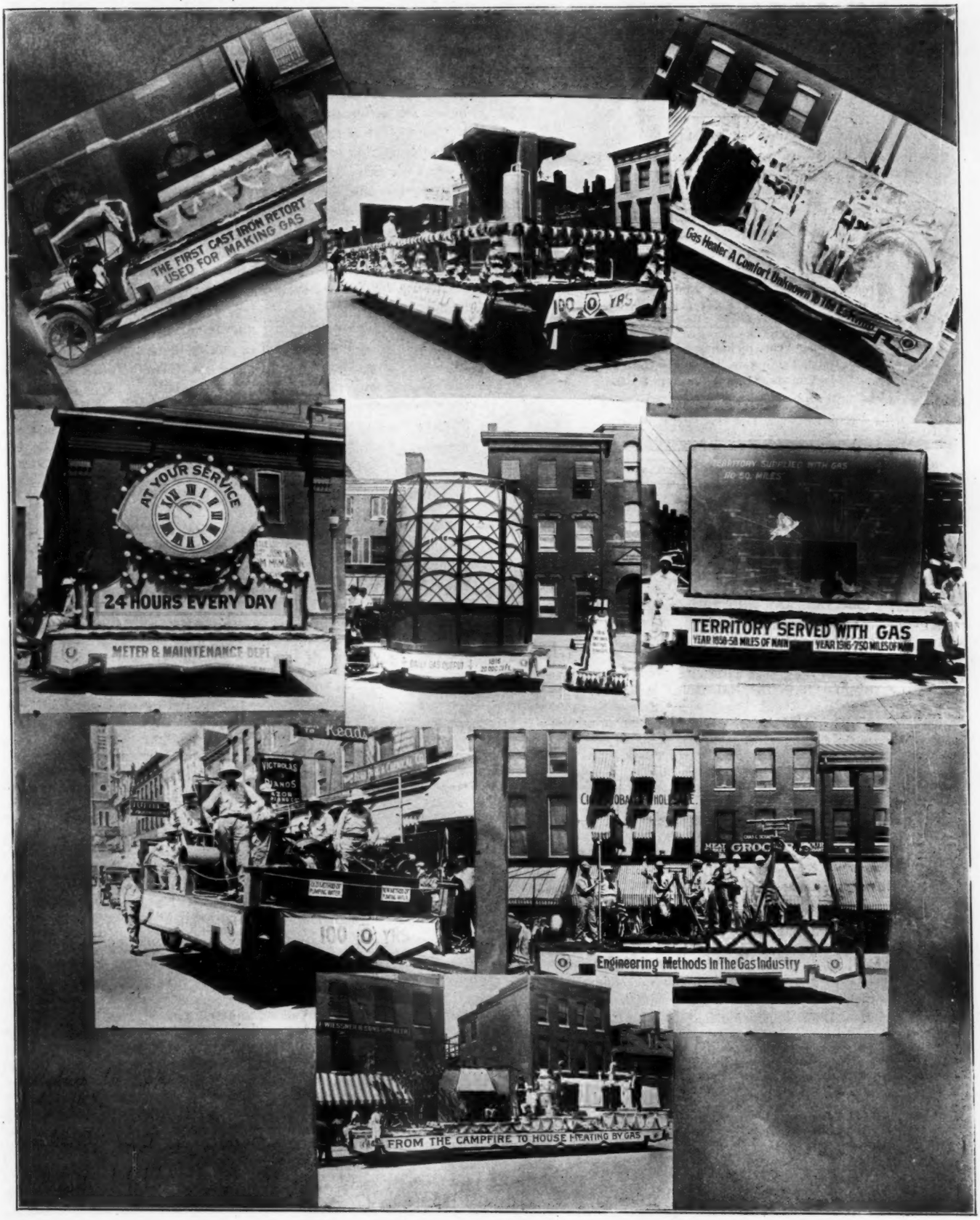
(2) An effort should be made to standardize the dimensions of lighting glassware, the shapes and sizes of globes and reflectors being limited to a convenient prescribed series.

(3.) The conditions for testing the reflecting power and other qualities, from a lighting standpoint, of globes and reflectors should be more practically formulated.

(4) An effort should be made to simplify and standardize the apparatus for testing different varieties of glass as regards color.

(5) The Illuminating Engineering Society should co-operate with other bodies in forming a committee to consider these problems.

Some of the Floats in the Baltimore Parade.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Educate the Consumer.

For a number of years the subject of maintenance of lighting equipment has been prominent in progressive communities, and we are now reaching the stage where the results of this agitation will be considered by at least two regulative bodies (New York and Massachusetts) where the question of changing from a candle power to a B. T. U. basis is under consideration. It may also be stated that few of the communities within their borders have been noted for activities in promoting a change from the flat flame burner to that of to-day.

At the hearing of the New York Commissions held last week in New York City, Chairman Strauss intimated that while charts showing the efficiency of the modern mantle burners were interesting to the Commission, they were more concerned in the success the company had had in making consumers aware of the advantages of mantle type burners, *through their use.*

In the Trenton, N. J., case, referred to in our issue of May 8, the decision called attention to the fact that a gas company must be able to show they have endeavored to teach the public that it was to their advantage to use mantle burners.

Each decision and each hearing makes more apparent the advantages of "Free Maintenance" in some form or other. Some of the ablest managers have seen that it is better to spend money on the consumer to improve the service than to have their rates cut, and are putting more energy into the maintenance end and increasing its scope each year.

Guild of Gas Managers.

The Guild of Gas Managers of New England held their mid-summer meeting June 27 at the Vesper County Club on Tyngs Island just above Lowell. Fifty-one members motored to the club. Those from the Boston district starting from the office of the Cambridge Gas Light Company.

The weather was perfect, and the members voted that the outing was one of the best that has been held.

Twenty of the members entered the golf tournament. Seven prizes were offered, and won, as follows:

Capt. A. F. Cooper	Best gross
H. A. Norton	Best net
W. B. Osborne	Second best net
H. K. Morrison	Best selected nine
Capt. Wm. E. MacKay	The kickers
"Chief" W. A. Wood	Never before

While the prize for the gross score was won by our old friend "Billy" Anderson, it was a source of regret to the gallery that Governor Hayward did not enter.

Every detail of arrangement was carried out perfectly by those in charge, including the 19th and 20th holes. "Any member who may have thought that the 19th hole would not be properly presided over was laboring under a decidedly erroneous impression."

Talking and Doing.

In the introductory remarks to his address at Baltimore two weeks ago, Mr. Glasgow touched on a much neglected aspect of efficiency in business, when he said:

"I am getting a positive distate for speeches and speechmakers—and for people who listen to them. Practice is proving that rostrum and nostrum are common derivatives. I am tired of doctrinaries, of sentimentalists, and of propagandists—and all other 'ists.' I am weary of words without thought, of feeling without logic, and of effort without knowledge."

We feel he should have included lengthy discussion without authority to make changes.

Special English Correspondence.

Monthly Letter from Norton H. Humphrys, Salisbury, England.

DEATH OF SIR CORBET WOODALL.—MR. JOHN WEST ON REFRACTORY MATERIAL.—THE SUMMER LIGHTING ENACTMENT.—THE CALORIFIC POWER BILL.

The death of Sir Corbet Woodall, at the age of 75 years, which took place on the 17th ult., is an event of more than passing interest, seeing that the gentleman in question had for many years been regarded, by common consent, as worthy of rank with the late Sir George Livesey, Mr. Thomas Newbigging, and other foremost men of the gas industry; and this is so well known, not only at home but also abroad, that any detailed account of his long and successful career is superfluous. He started at an early age as an engineer and manager of Gas Undertakings, subsequently relinquished that position for general consulting practice, and later on obtained, not only as the Chairman of the largest gas undertaking in the United Kingdom, but as director or consulting engineer to many other important concerns both home and foreign, a position as the recognized leader of the Industry. The energy that he threw in to the working of the Jubilee Gas Exhibition in 1913, the formation of the British Commercial Gas Association, and the reorganization of the Gas Light and Coke Company, are not likely to be forgotten. And no concern with which he was connected was ever found to be taking a back seat, in the matter of progress and development. He was a recipient of the "Birmingham medal," which is regarded as the Blue Ribbon of the Gas Industry, having been awarded that well merited distinction in 1913. The extent to which his example has proved, and will prove an incentive, in connection with every department, is a matter that could scarcely by any possibility be over estimated. He belonged to a well known "Gas" family, and although the Industry has sustained an irreparable loss by his removal, he leaves sons connected with it who are likely to fully maintain the honorable position connected with the name.

Mr. John West, the well-known head of West's Gas Improvement Company, of Manchester, recently read an important paper on "Silica and Fireclay Materials for Retort Settings," before the Manchester District Institution of Gas Engineers. The introduction of regenerator furnaces, mechanical stoking, heavy charges, inclined and vertical retorts, all tending in the direction of higher working temperatures, has directed attention to this subject, and for some years it has been under the consideration of a special committee appointed by the institution of gas engineers, who have already issued some valuable reports, suggested specifications for material, etc. Work of this nature is for the moment greatly hindered by the war. The fact that the subject was not entirely a novelty to his audience, led to a fuller appreciation of the information that Mr. West, by reason of his long and unique experience as engineer of important undertakings and as a practical constructor of retort settings, was in a position to supply, and to a complete and powerful discussion.

Mr. West dealt not only with British, but also with American and continental practice, and commenced by strongly condemning the system of purchasing refractory material by lowest tender without any definite stipulation as to quality, as "very extraordinary and very wrong," as conducive to the supply of inferior material, and certainly no encouragement to the manufacture of the best possible quality. Under such conditions many firms would not offer their best goods. A plan he adopted in preference to this "old and pernicious system" was to invite four well-known firms of good repute to tender for ten settings each, of the best quality, with a view of practically testing the materials under similar conditions, the makers to be informed that future orders would depend on the results of each tests. While the first cost was more, the working results were highly satisfactory, and the cost of gas manufactured was less. A saving of say 1/- per foot run of retort was not a large matter, the cost of labor for setting being irrespective of the quality of the material. Against this the better quality retorts lasted twice as long, the annual saving on maintainance charges was very considerable, and there was a larger yield of gas per ton of coal carbonized. Mr. West strongly advises the purchase of the best materials, but these cannot be properly identified without careful and continuous investigation.

Mr. West's long experience with mechanical stoking has led to an appreciation of the importance of contraction and expansion under high temperatures, in connection with the working life of the setting. As a general rule, silica bricks expand, and fireclay ones contract with increase of temperature, and therefore it was possible that by careful and steady experiments with various mixtures, the effects of expansion and contraction could be brought to a minimum. And he favored segmental rather than moulded retorts, on account of the practical difficulties connected with the proper blending of silica and fireclay material. His experience did not support the theory that a high percentage of silica was necessarily an indication of high refractory qualities, and generally he appeared to attach more importance to the behavior of the material under suitable tests, than to its composition as indicated by analysis. This part of the paper was illustrated by an outline of the manufacturing processes at the fireclay works in which he was interested, for the production of various qualities of refractory goods for steel works and for gas works.

Another important consideration dealt with in the paper, was not only the refractoriness of a single brick when exposed to high temperatures, but the resistance of the same material under load, such as that obtaining in the lower parts of a vertical setting. He quoted several examples of materials that would stand over 1700° C. in the laboratory furnace, but failed under practical conditions of load, at a temperature of 1350° to 1450°. He described a method of conducting load tests, and stated that silicious brick was superior to the best fireclay, for heavy load at high temperature. The load refractoriness of a material being known, that limit should never be exceeded in practice.

In the course of the discussion it was pointed out that if the material, during the process of manufacture, was submitted to a rather higher temperature in a loaded kiln than would be required in practice, for a sufficient time to ensure the heat being thorougly soaked in, a satisfactory practical test as to yielding under load would be effected. And if the kiln temperature was not so high as that subsequently experienced in practice, then certain work in the way of expansion and contraction remained to be accomplished in the setting, that could have been done in the kiln. Also it appeared that many gas engineers retain the old custom of stating the working life of a setting as being the same thing as the number of days it was under fire. This might have been a fairly approximate method in the days of hand charging, but modern improvements have brought in so much variation in the weight and duration of the charge, that it no longer applies. A setting that averages 5 tons of coal per 24 hours, and a yield of 12,000 cubic feet of gas per ton, over 1000 working days, is not inferior to one that averages 4 tons of coal and a yield of 11,000 cubic feet per ton over 1250 days. An accurate record of the working life of every setting of retorts, together with full details as to weight and duration of charge, yield of gas per ton, consumption of coke as fuel, etc., should be among the records at every gas works. The remarks as to the "old and pernicious system" of purchase apply equally to coal and all kinds of material subject to variation of quality that do not become evident until they are put to the practical test; and the evil is accentuated by the absence of technical knowledge on the part of the purchasing agent.

The Summer Lighting Law, dealing with a subject that has been brought forward for many years under the title of "Daylight Saving," and hitherto regarded as an impracticable fad, came into operation the 21st ult. During the night of the 20th, all public clocks were put forward one hour, private individuals followed suit, and from that date the public are supposed to rise in the morning, take meals, begin working hours, and retire at night, all one hour earlier than before, the object in view being economy of artificial light, and consequently of coal and labor. There is no reason for believing that this step will have any important effect on the revenue of gas undertakings. It is early yet for comparisons, and in many cases such are not possible, seeing that within the last six months a large reduction in public lighting has been the rule. The question will be affected by local conditions, and consequently reports vary. A large proportion of the total consumption of gas for lighting is governed by the actual hours of

darkness, which are quite beyond human control, rather than by the hands of the clock. This is the position in regard to public lighting, railways and factories where night shifts are worked. Shops and stores did not, under the old regime, use any appreciable amount of artificial light during the summer months. At this time of year many people prefer to enjoy the warm weather and long twilight by sitting out of doors after supper, and during hot weather to sit up later than usual, so as to allow the bedrooms to get cooler. They are not likely to relinquish these habits at one stroke, nor even after prolonged experience, to acquire the practice of retiring to rest in broad daylight. So there is no reason for expecting the output of gas to suffer, at any rate within six weeks of the longest day (the 21 inst.) Possibly the effect may be more marked during August and September, when the evenings begin to draw in. During the winter months, October to March, the new scheme offers no advantage, because an hour saved in the evening only means an additional hour in the morning, and therefore it is purposed that a return shall be made to normal hours on October 1st. The licensing restrictions and reduction of public lighting are likely to be more effective, so far as economy of coal is concerned, than the Summer Lighting Bill. The gist of the question is a matter of public health, convenience and security, but a discussion of such points does not come within the scope of this letter.

An Act of Parliament submitted to the House of Commons by the Board of Trade, under the title of the Gas (Standard of Calorific Power) Bill authorizes the substitution of a standard of calorific power for the standard of illuminating power at present in use, and of the calorimeter in place of the photometer as the legal testing instrument. On application by any statutory gas undertaking to the appropriate Government department—The Board of Trade for Joint Stock Corporations, and Local Government Board in England, or the Secretary of State in Scotland or Ireland, for Local Authorities in the respective countries, an order may be granted, replacing the present clauses as to illuminating power, by a prescribed calorific standard, together with conditions for testing, and penalties in case of default. There is reason to believe that the standard in view is 500 B. T. U. per cubic foot. In considering the expediency of making an order under this Act, the department will have special regard as to whether the undertakers already have plants for extracting crude benzol from the gas, or are prepared to immediately erect and work them. Public notice of all applications made, and as to the place and time for lodging objections, is to be given in such manner as the department may direct, and they will consider all objections, and if thought necessary, hold an inquiry at the expense of the undertakers. The introduction of a simpler, less costly and more expeditious form of procedure than the Provisional Order or Special Act, that has hitherto been the only means of adjusting the quality clauses to the needs of modern requirements, will be welcomed by gas undertakings, and while they are at it, the Board of Trade might with advantage reconstruct the existing absurd and obsolete clauses relating to pressure of supply.

The Case for Steel Pipe.

It has been shown that iron and steel may be made less susceptible to corrosion by the addition of certain elements, but it is a matter of common experience that some parts are more resistant to attack than others without these additions, and iron manufactured to-day is not quite the same, in some respects, as that produced formerly. The substitution of modern methods and machine processes for the old hand way of refining has resulted in a different product, both chemically and physically, and co-incident with these changes there has been a tremenduous increase in the use of iron and steel and perhaps an equally great alteration of the conditions of service. It is not strange, therefore, that a good deal of difference of opinion, has arisen regarding the relative merits of the old and new varieties, especially their resistance to corrosion.

The controversey over wrought iron and steel pipe, for instance, has been very animated. Perhaps one reason for this is that nearly everyone uses pipe, or comes in contact with it in some way; then the conditions to which a steam or water pipe are exposed are rather unusual and just the opposite of what generally obtains. On the whole, ordinary ironwork is subjected to a large excess of air containing varying amounts of moisture and gases; only at long intervals, as from rain and snow, does the surface become wet. The inside of a pipe line, on the other hand, is in contact with a large excess of water which may contain much or little oxygen or air. In a line from which the water is frequently drained out or holds a large amount of air, the conditions for rapid and severe corrosion are present, and it is not surprising that such a line may go to pieces in a short time. When this happens it is perhaps natural to ascribe it to inferior materials, and unless trouble is taken to ascertain all of the facts, very erroneous notions often become current. Such a one is the belief held by some that steel pipe is considerably inferior to pipe made from wrought iron.

There is no doubt that the steel produced ten or fifteen years ago was not the equal in all respects to that turned out to-day; but by reason of the improvements introduced from time to time the quality has risen, until it may safely be said that there is no ground for comparing it unfavorably with wrought iron, at least without a fair trial.

The way iron ore is reduced in the blast furnace, produces pig iron containing several per cent. of other metals and metalloids, therefore, the iron must be refined before it is suitable for use other than in making castings. Iron may be refined in several ways, but for our purpose only the puddling furnace and Bessemer converter need be considered.

In puddling, the iron is melted on a bed of iron ore which gives up part of its oxygen to oxidize the carbon, silicon, and manganese, and, to a less extent, the sulphur and phosphorus. The greater the purity of iron, the higher the temperature at which it melts; therefore, the metal in the furnace becomes pasty after a time as the impurities are burned out, and is worked into a ball and removed. This ball is rolled into bars of convenient size which are cut and piled up, then reheated to a welding temperature and rolled again into a bar of the desired dimensions. Wrought iron produced in this way is very pure, the greatest and most objectionable of the impurities being the slag, scattered through the metal which gives it the apparently fibrous structure characteristic of its appearance after rolling. These fine slag lines are easily detected and form a ready means of distinguishing wrought iron. It is only necessary to smooth down a small spot with a file, when the lines will show up; best, under a magnifying glass. The puddling process is rather slow and expensive, since only a few hundred pounds can be treated at a time. Something like an hour and a half is required for a charge, and considerable skill and care are needed to obtain a good product. The presence of 2% or so of slag distributed irregularly throughout the mass can hardly tend to increase the homogeneity, and it is generally accepted that lack of this is of more importance, from the standpoint of corrosion, than the presence of a reasonable amount of impurities thoroughly and uniformally mixed in. It is very hard to perfectly weld sheets or bars several inches in width, so many laminations are met with and may give trouble.

In the Bessemer process, molten iron from the blast furnace is run into huge mixers, then into egg-shaped converters, where cold air is blown through the charge. The entering oxygen rapidly burns out the impurities, and thereby generates heat; so no difficulty is experienced in keeping the metal molten. The length of time the air is blown through is determined by the color of the flame issuing from the mouth of the converter. As might be expected, more or less of the iron is oxidized; but the addition of a small amount of manganese, for example, will take care of these oxides, so the requisite quantity of this, calculated from an analysis of the iron, is added with such other elements as may be needed. It requires only ten or fifteen minutes to convert as many tons of iron into steel, so in point of speed and economy the Bessemer process is superior to the other. It is especially adapted to making low carbon steel, and, as a matter of fact, gives a product more nearly pure, considered on the score of total impurities, than that from the puddling furnace. As a general proposition, the silicon, carbon, sulphur, manganese, and phosphorus may be lower in the wrought iron than in steel, but the former will contain about 2% of oxides, while in steel these will not run over one or two tenths of 1%. From the nature of the process whatever impurities are present are well distributed, and as the metal is rolled directly into skelp, without cutting and re-welding as in the case

of wrought iron, the danger from laminations is greatly reduced. Up to about 28 years of ago, hand puddled iron was used entirely for making pipe. With an increasing use of pipe, however, the discovery that steel could be welded when treated properly, and the discovery of cheaper and better processes of making it, two classes of pipe appeared on the market, iron and steel. With the many manufacturers in the field different grades of these appeared; in fact there is as much difference between some of the wrought irons as between it and the steels, and there is a corresponding disparity between steels. All of this has tended to increase the confusion, and inasmuch as any new material is likely to be looked upon with suspicion, it is only natural that there is lack of agreement regarding the length of life which iron pipe, as contrasted with that made from steel, might be expected to give.

As a consequence, a good deal of experimental work has been done, and several investigations of the conditions found in actual service have been carried out. An experiment conducted about 12 years ago by the Bureau of Steam Engineering of the Navy Department on lap-welded Bessemer steel, lap-welded iron, seamless cold-drawn steel, and seamless hot-drawn steel boiler tubes, may be of interest.

Care was taken to secure good, representative samples of these materials, and analysis showed them to be of the following average composition:

	Cold-drawn seamless	Hot-drawn seamless	Bessemer steel	Iron
Silicon	0.005	0.005	0.008	0.024
Sulphur	0.043	0.039	0.081	0.014
Phosphorus	0.015	0.016	0.110	0.038
Manganese	0.50	0.49	0.31	Trace
Carbon	0.16	0.14	0.063	Trace
Oxide	0.23	0.30	0.28	1.03

The test consisted in weighing the parts, then immersing them in distilled water, through which air was bubbled, for a total of sixty-four weeks divided into four periods of 16 weeks each. At the end of each period the samples were removed, thoroughly cleaned, and weighed. The results may be averaged thus:

Average Loss in Grams per Square Inch.

	First Period	Second Period	Third Period	Fourth Period	Total Loss	Loss Compared with Iron as 100
Hot-drawn Open-Hearth Steel	.3034	.5333	.3610	.5070	1.6947	93.7
Bessemer Steel	.3147	.4950	.4043	.4945	1.7085	94.5
Cold-drawn Open-Hearth Steel	.3232	.5564	.4502	.5017	1.8315	101.3
Charcoal Iron	.3326	.5896	.3966	.4893	1.8081	100.

It will be seen that there was no great difference in the loss in weight of these four materials; the charcoal iron, which showed the greatest initial loss, ended up with a decrease about 6.3% larger than that of the open hearth, hot drawn tubes, which suffered the least.

From data collected by the American Society for Testing Materials, 1908, and experiments reported in "The Iron Age," the table following has been drawn up summarizing the results of a number of other laboratory tests, largely on wrought iron and steel skelp. The specimens were exposed to the weather or immersed in different kinds of water and the loss in weight determined.

The table on next page shows that even the steel manufactured fifteen years ago was slightly better than the wrought and charcoal irons of the same period. But while laboratory tests may indicate what may be expected in practice, actual service results are naturally more reliable; so about the time the last of the above tests were being carried out, a new line of investigation was started.

Prof. Thomson joined up a hot water line of wrought iron and steel pipe in alternate sections, so that they would all be subjected to the same conditions. After a year of serviee, he concluded that steel might be expected to stand up about 7.5% longer, under such conditions, than wrought iron.

A short time later a test carried out under similar circumstances under the auspices of the American Society of Heating and Ventilating Engineers, using steel and iron pipes supplied by several makers, checked up closely enough with the previous one and the report of the trial concludes: "We believe this test demonstrates that modern steel pipe of good quality is at least as durable as modern strictly wrought-iron pipe of good quality, and is very much superior to a poor quality of wrought iron in this class of work."

Other tests by different observers under a variety of conditions have lead to the same general conclusion. Thus, several experiments conducted by the Pittsburg Coal Co. and the H. C. Frick Coke Co., to mention only two, wherein the samples were immersed in running mine water, which generally contains considerable quantities of acid, show that steel corrodes faster than wrought iron. Again, the work of Howe and Stoughton gave results in broad agreement with this conclusion. Commenting on the tests of these two experimenters and the evidence they collected, Alfred Sang says, in his book: "Of ten different tests made by different observers in different places, seven resulted decisively in favor of steel; in the other three cases the results were very slightly in favor of the iron, but in only one of the latter was the material of modern manufacture.

"The tests which resulted in favor of steel were as follows, all except the two first being carried to destruction: Seven months in hot, aerated salt water; sixteen months buried in dampened ashes; exposed to sulphuric acid coal-mine water; in railroad interlocking and signal service; in locomotive boiler service.

"It was also found that steel tubes made in 1906 pitted much less than those of 1897 from the same makers, indicating the superiority of modern steel over that of some years back in this respect."

All of the work on this subject has not been confined, however, to either laboratory or short installation tests, at least two rather extended investigations having been undertaken on pipe lines in service. The first was conducted by Prof. Woolson on some of the public bath houses of New York City, where much trouble was encountered from the rapid corrosion of the hot-water pipes. An examination of the situation showed that conditions were not materially different from those in similar installations in other places. Croton water was used, heated in various standard types of heaters to 160° to 200° F. The quantity of water passing could not be determined, but it was considerable, as many thousands of baths were given during the hot weather. It developed, further, that all of the pipe in use four years or over was giving trouble, and in a few places pipe only two or three years old had perforated.

In all, eleven houses were inspected, but for various reasons samples were collected from only eight. From these eighty-nine specimens were obtained, varying in size from $\frac{3}{4}$″ to 4″ diameter, the majority being $1\frac{1}{2}$″ and 2″. Small pieces were sawed from each specimen, crushed, and the fracture examined by two experts independently, to determine whether the material was wrought iron or steel; chemical analyses were then made of all samples at all doubtful in classification.

The following are typical results of the chemical analyses:

Per cent Manganese	Per cent Carbon	Per cent Oxide	Classified
0.48	0.09	0.20	Steel
0.32	0.08	0.26	"
0.42	0.08	0.21	"
0.38	0.08	0.30	"
0.50	0.08	0.38	"
Trace	Trace	2.85	Wrought iron
"	"	2.40	"
"	"	2.20	"
"	"	2.50	"
"	"	1.75	"

From this work it was decided that seventeen out of the eighty-nine samples were wrought iron; these had come from six of the

Investigations on the Corrosion of Wrought Iron and Steel.

Authority.	Date.	Conditions of test.	Duration of test.	Material tested.	Relative loss of weight.
Prof. H. M. Howe	1897	Sea water normal temp.	2 years	Steel skelp	117 per cent.
				W. I. skelp	100 "
Prof. H. M. Howe	1897	River water normal temp.	2 years	Steel skelp	94 "
				W. I. skelp	100 "
Prof. H. M. Howe	1897	Weather	2 years	Steel skelp	103 "
				W. I. skelp	100 "
U. S. Navy Dep't	1901	Aerated, dist. water normal temp.	64 weeks	Charcoal iron	100 "
				Pipe steel	94.5 "
National Tube Co.	1904	Aerated brine normal temp.	6 months	Puddled iron	100 "
				Pipe steel	106 "
National Tube Co.	1905	Aerated water 180° F.	3 months	Puddled iron	100 "
				Pipe steel	90.6 "
National Tube Co.	1906	Aerated brine 180° F.	3 months	Charcoal iron	80 "
				Puddled iron	100 "
				Pipe steel	75.3 "
Prof. H. M. Howe	1906	Aerated sea water 180° F.	3 months	Charcoal iron	94.4 "
				Puddled iron	100 "
				Pipe steel	94.2 "

eight houses. Of the other two, no samples were examined from one and those collected from the last were proved to be steel. The data may be arranged in tabular form as follows:

Material supplied	Bath house	Classification
Probably steel	11th St.	2 Iron—6 Steel
"	76th "	2 " —5 "
Not certain	23rd "	2 " —4 "
Steel	41st "	5 " —7 "
"	Rivington "	2 " —23 "
"	109th "	4 " —11 "
		17 56
Total of mixed samples		73
Steel	Allen St.	16 steel
Total of all samples		89

The contract specifications for all except two of these houses called for wrought iron pipe, galvanized, but plumbers and dealers often do not make any close distinction between iron and steel pipe. A few years ago many mills were making both kinds of pipe and it would be very easy to mix them in shipment.

However that may be, it will be seen that of the mixed samples 23% were wrought iron. Bearing in mind that the two kinds of pipe were used indiscriminately and, therefore, were all exposed to the same conditions, that all samples were tested to destruction, and that probably not more than 10% of the welded pipe on the market is wrought iron, it appears that steel showed up to very fair advantage.

After his investigations Prof. Woolson decided: "In my judgment, there was absolutely no difference in the corrosion of the two classes of pipe. They appear to be equally susceptible to the attack."

A similar study was made by Dr. Walker to determine how these materials stood up in service in the same system, separated from each other only by a coupling. Under these circumstances, the wrought iron and steel pipe would be subjected to as nearly identical conditions as could be obtained.

Briefly, the method pursued was to examine a large number of steam and hot-water systems operating in different places and under different conditions. It chanced that the majority of the samples collected came from hot and cold water feed systems, but enough were obtained from steam lines and other installations to make the results of general interest.

The specimens were split lengthwise and cleaned of rust and scale with ammonium citrate solution, after which the extent of corrosion was calculated by measuring with a micrometer the ten deepest pits occurring in lengths of about 12 inches.

In all, it was possible to obtain sixty-four comparisons and the results may be summed up thus:

Comparative Corrosion of Wrought Iron and Steel Pipe.

Instances where iron corroded more than steel	20
Instances where steel corroded more than iron	18
Instances where iron and steel corroded equally	9
Instances where corrosion was negligible	17

In the light of the facts brought out by this work, Dr. Walker felt justified in concluding that on the average there is no difference in the corrosion of iron and steel pipe.

Immersion in sulphuric acid has been used as a means of determining the comparative resistance to corrosion of different samples of iron and steel, and as an interesting sidelight to the above work, Dr. Walker conducted some experiments to find out whether this test has any real value. As he reports it: "In order to show what relation may exist between the so-called acid corrosion test and the real corrosion in service, eleven pairs of iron and steel were selected and subjected to 20% sulphuric acid for 4 hours at room temperature. Four pairs were selected in which the steel was decidedly better than the iron in service, four in which the iron had shown decidedly better than the steel, and three in which there were no difference between the two metals.

"In six instances the relative corrosion as shown by the sulphuric acid test corresponded with the corrosion in service. In five instances corrosion by the acid test was exactly contrary to that found in service. Although the greatest care was taken to have the specimen of the same size, cleaned in the same way, and in the same physical condition, the results show that no reliance can be placed in this accelerated acid test, but that it may be entirely misleading. Not only did the acid test not agree with the service test when steel was compared with iron, but the steels failed to agree among themselves, and the irons showed no agreement considered by themselves."

It may be added that these conclusions have been reached by other investigators working independently. It appears that, whether one is testing pipe or paint or almost anything else, an actual service test is the only reliable criterion of merit.

Viewing impartially all of the data presented so far, there seems to be little to choose between wrought iron and steel pipe, as regards their resistance to corrosive influences, but one point may be mentioned with reference to the manner in which these materials corrode: With steel the rusting takes place more or less uniformly over the surface, while wrought iron shows an inclination to form deep pits. That this is a dangerous tendency can hardly be doubted.

In the course of the investigation mentioned above, Dr. Walker found that in the most corroded samples, the average depth of

pitting was 0.130 of an inch for the iron, and 0.118 for the steel. Likewise it was found that of twenty-six samples of iron pipe removed from the hot-water boiler-feed lines in the power plants of the H. C. Frick Coke Company, the average of the deepest pit in each was 0.112 of an inch, while the average of twenty-six steel samples taken from the same lines was 0.108. These differences are not startling, but seem to indicate a weak point in wrought pipe.—*From article by L. C. Wilson in Engineering Magazine.*

Manufacturers' Emblem.

The Manufacturers' Section of the National Commercial Gas Association has adopted this official seal. Its use upon stationery and in connection with the advertisements of gas appliance manufacturers will be permitted only to those who are members, in good standing, of the Manufacturer's Section. It will be in the nature of an official O. K. upon the company and its goods, certifying, in the first place, the manufacturers' co-operation through the Section and the N. C. G. A., with the best interests of the gas industry, and in the second place, testifying to the fact that the manufacturer has adopted such standard specifications for gas appliances as the Association has approved.

This is a step in the right direction, and the gas fraternity are urged to throw their influence to the side of the users of the official seal. It stands for the protection of gas maker and gas user; and whenever the buyer of manufactured appliances for the making, distribution or using of gas, insists upon its presence in the catalog or on the order blank, he is securing his own protection and encouraging the growth of the industry, by encouraging the men and companies who are actively interested in the co-operation and development that the Association stands for.

New Methods and Appliances.

Combination Gas and Electric Range.

In the line of electric ranges placed on the market by the Westinghouse Electric and Manufacturing Company, is a type in which the four top electric heaters have been replaced by gas burners, thus using gas on top of the stove and electricity for the oven. In the center of the four burners is an automatic gas lighter, controlled by a button valve in the front of the stove.

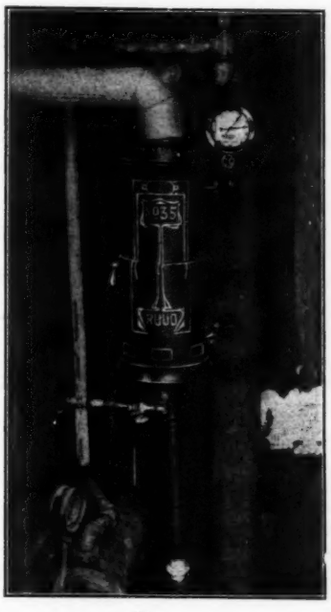
Westinghouse Combination Gas and Electric Range.

The oven equipment of the range is identical with that in the Westinghouse standard type of electric range, a large oven 18½ by 13½" by 16" deep, requiring 2,000 watts, and smaller oven, 10⅜ by 13½" by 11½" deep, requiring 850 watts. Three indicating switches are provided for the oven heaters. A one-oven range is also manufactured, requiring 2,000 watts. Automatic time and temperature control is provided.

This is the fore-runner of a type we believe will be popular.

Heating 10,000 Gallons of Water.

One of the largest wholesale houses in Bloomington, Ills., the Campbell Holton Wholesale Grocery Company, which occupies a large building, has an automatic fire extinguisher system, consisting of a storage tank on the roof which feeds to mains supplying fire outlets in all parts of the building. The tank being on the roof, it has been necessary during the winter months to prevent freezing by applying heat to one of the 6" main lines in the building beneath the tank by means of a cast iron steam cylinder 3' and 12" diameter surrounding the main, and supplied with steam from the heating plant. This proved very expensive as it was necessary to keep the heating plant going 24 hours a day, and the total cost of supplying steam heat to the building and tank figured around $120 a month. Roughly this covered two cars of coal a month, 50% of which was used to heat the water system.



Water Heater Heating 10,000 Gallon Tank.

A salesman of the Union Gas and Electric Company discovered this heating plant some time ago, and went to work to bring about the substitution of gas; as a result of his efforts a circulating tank heater has just been installed, attached to a main that leads directly into the tank and has a gate valve at the base of the tank. This line is tapped a few inches above the gate valve and a 1½" riser leads from the copper coil heater into the tank. When the gate valve is closed and the heater is in action, this forms a proper circulation. The gas is doing the work satisfactorily on 50 feet per hour consumption. The installation burns 24 hours a day and adds approximately 36,000 cubic feet monthly gas consumption.

Items of Interest from Various Localities.

MR. SIDNEY MASON, President of the Welsbach Company, has notified the managers of the various departments that all employees of the company who are members of the National Guard will receive full pay while on duty with the army and their positions held open for them.

THE Brooklyn (N. Y.) Union Gas Company has made a similar announcement, and Mr. R. W. Bush, engineer of manufacture, has left for the border as Captain in the 22nd N. Y. Regiment.

MR. C. H. Geist, president of the Northern Indiana Gas and Electric Co., says that Company will pay men while on duty with their regiments and will hold their positions open.

ALL employees of H. M. Byllesby & Company who are members of the National Guard will receive full pay during their absence, and their positions will be held for them.

AT the Second Regiment Armory, Philadelphia, Pa., on June 22, Samuel T. Bodine, president of the United Gas Improvement Company, with other officers, presented a handsome American flag to the company of United Gas employees who have joined the colors for service in response to the call of the President.

EMPLOYEES of the Grand Rapids (Mich.) Light Company who may be ordered to the Mexican border for military service will not lose their share in the employees' dividends, as their names will be retained on the company's payroll. Whether they will receive pay for the time absent has not been decided.

AFTER two years of patient research it has been ascertained that there is no legal obstacle to the passage by the (Philadelphia, Pa.) Councils of the ordinance which will make operative the agreement between the city and the United Gas Improvement Company and the Welsbach Street Lighting Company, for the transfer of 11,200 gasoline lighted lamps to gas main connections, which will result in the annual saving to the city of $70,000 a year. When this ordinance was reintroduced and referred to the Finance Committee, the bill was referred to the City Solicitor, who has just notified the Finance Committee that the passage of the bill will in no wise affect the existing lease of the municipal gas plant to the United Gas Improvement Company. The agreement was effected two years ago between Director Cooke and President Bodine, of the United Gas Improvement Company, but certain interests in the Finance Committee opposed the ratification of the agreement in Councils during the life of the Blankenburg administration. Mayor Smith and Director Datesman have revived the agreement, and it is proposed to pass the ordinance at the next meeting of Councils.

THE Pittsburgh By-Product Coke Company has been incorporated under the laws of the State of Delaware with a capital stock of $10,000,000 to engage in owning and operating plants for the manufacture of coke and its by-products. The officers are H. B. Rust, president; W. F. Rust, vice-president; C. J. Ramsburg, vice-president; S. T. Brown, treasurer; and the directors are A. W. Mellon, R. B. Mellon, H. W. Croft, Hamilton Stewart, H. B. Rust, W. F. Rust and C. J. Ramsburg, all of Pittsburgh. The company will own, among other securities, all of the stock of the Seaboard By-Product Coke Company, which is building a plant of 110 coke ovens at Jersey City, and the Minnesota By-Product Coke Company, which is building a plant of 55 coke ovens at St. Paul.

THE United Gas Improvement Company has been investigating the possibilities of dye manufacture. President Bodine recently stated that: "We can make the dyes, but whether it would be profitable after the end of the European war unless we have a strong protective tariff in the dye industry is doubtful. Therefore we have reached no decision to go ahead in the matter. Our information is that dye plants in Germany have been running about 50% capacity since the war began, and when it is over it may be expected that large stocks will be shipped from there to this country in competition with dyes of domestic manufacture.

CONTEMPLATED improvements at the Westfield (Mass.) Municipal plant include a new booster set.

THE Engineering Foundation, the initial endowment of which was received last year from Ambrose Swasey, of Cleveland, and is administered in the interest of scientific research by trustees from the National Societies of Civil, Mining, Mechanical and Electrical Engineers, representing 30,000 engineers in all, held a meeting last week at the University Club, Cleveland, O., at which it was decided to offer the services of the Foundation to the National Academy of Sciences of the United States to accomplish the federation of all the research agencies of the nation, governmental, university and private, with the object of encouraging the application of scientific principles to American industries and the employment of science in the national defense which the possibility of war renders particularly important at this time. It is decided to spend from $8,000 to $15,000 per year on a competent executive secretary to assist in the above mobilization.

KALAMAZOO (Mich.) is known to the gas fraternity as the Birthplace of the Gas Arc and the Instantaneous Water Heater. It is also famous as the home of the first of Americas Womens' Clubs, and its celery makes turkey more delicious. Not content with these distinctions, the city is endeavoring to obtain fame as a "Quibbler." They went all the way to England to obtain a report as to the gas rates, but were too obstinate to agree with its contents. They are now making things unpleasant by kicking about the service, and some idea as to their methods may be had from the following item from the local "Gazette."

"A meeting between F. W. Blowers, general manager of the Michigan Light Company, and members of the city council has been called, following a report filed with the aldermen by City Engineer Andrew Lenderink, showing the weekly average of heat units in the gas manufactured by the company to again be below the standard fixed in the city's ordinance. The conference will be held to find out just how soon the company will be in a position to furnish the standard quality of gas. Following the engineer's report, showing the gas to have averaged 598 B. T. U.'s during the past week, Mayor J. B. Balch and several of the alderman announced that numerous complaints had been made to them concerning the poor quality of gas in Kalamazoo. They will insist that there be an improvement in the quality of gas at once."

THE Central States (Ind.) Gas Company has been formed in Indiana to take over the artificial and natural gas plants at Olney, Sumner, Bridgeport and Lawrenceville, Ill., and the Vincennes (Ind.) Gas Co. The main office will be in Vincennes. The directors of the company named in the incorporation papers are Joseph A. Sloan, Napoleon, O.; William J. Hartnett, Fulton, N. Y., and Harry J. Sloan, Vincennes, Ind. Secretary Geo. G. Ramsdell would feel strange were he to revisit his old baliwick.

NEW fronts have been put in at the gas offices at Arkansas City, Kan., and Flushing, N. Y. Here's a chance for the Window Dressing Committee.

THE Brooklyn Union Gas Company Employees Association, the Progress Club, held its annual meeting on Monday, June 19th, at 180 Remsen street, Brooklyn. The principal business was the election of officers, which resulted as follows: J. J. Mackey, president; R. C. Kellogg, vice-president; Jos. Witte, treasurer; C. O. Chichester, secretary; L. E. Hamilton, marshall; A. McDowell, sentinel. The club held its summer dance on Friday evening of the week before at Trommers' Garden, concluding the season's entertainment.

WHETHER the consumers of Americus, Ga., shall pay a higher rate in order to enable the Americus Public Service Company to retire a $250,000 bond issue and turn over its property to the municipal government, is the unique question confronting the Georgia

Railroad Commission. The company has applied for authority to raise the gas and electric rates, claiming that it was authorized to issue $250,000 of 6% bonds on condition that it would provide a sinking fund to retire the bonds in 20 years and would turn over the gas and electric plants to the Americus city government when the bonds were retired. But now it finds the sinking fund a greater expense than it can meet unless its rates are raised, according to the petition; and the proposed advance is opposed by the consumers of Americus.

OWING to a break in the pipe line supplying Elmira, N. Y., with natural gas, it was found necessary to start up the old plant last week.

A 100,000 cubic feet gas holder has been ordered of the Stacey Bros. Gas Construction Company for the Murphysboro (Ill.) plant of the Southern Illinois Gas Co. This will be installed as soon as the materials can be had and will be ready for use by the end of November. The present tank has a capacity of 30,000 cubic feet and gas is pumped direct to the mains on account of lack of storage capacity. The plans and specifications for the additions to gas and electric plants at Murphysboro have been prepared and work on these will be started as soon as possible.

THE "Chicago Journal," under date of June 22, states that the Columbus Gas & Electric Co., has withdrawn its application to furnish natural gas to Baltimore, Md., on account of excessive taxation arrangements. The office boy made a notation on this clipping that is self explanatory. H-o-o-r-a-y!

ANOTHER effort is being put forth to have the Taunton Gas Company consider extending its mains to Foxboro, Mass. The failure of a gas company, to which a franchise was granted, to live up to the terms of the franchise has caused a disappointment to those who were expecting the installation of gas this summer.

A GIFT of $25,000 to John Hopkins University, made by J. E. Aldred, of New York, Chairman of the Board of Directors of the Consolidated Gas, Electric Light and Power Company of Baltimore, to be applied to the engineering department of the university, was announced June 22 by Dr. Frank J. Goodnow, president of the university. The sum is to be given to the university in instalments of $5,000 annually, and is to be used in such manner as the faculty shall determine in furthering the practical element in the courses in engineering. The gift will enable the university to strengthen greatly the engineering department. It came unsolicited. We wonder if the ragging the engineers gave Mr. Aldred at the centenary meeting had anything to do with the gift.

THE New Haven (Conn.) Gas Light Company has contracted with the Isbell-Porter Company for a new purifying outfit to cost about $80,000.

J. F. MCGUIRE, manager Northern States Power Company Minot division, has been appointed a member of the committee of various civic bodies which will have in charge a mammoth 4th of July celebration in Minot, N. D., this year.

C. M. BREWER, manager of Western States Gas and Electric Company, Richmond division, as chairman of the Decorating Committee of the 4th of July celebration to be held in Richmond, Cal., this year, has made arrangements for a great deal of special illumination for streets and buildings.

J. A. PERKINS, who has been appointed general manager of the Lockport (N. Y.) Light, Heat & Power Co., succeeding E. Z. Wallower, was formerly general manager of the Union Gas & Electric Company of Bloomington, Ill.

MAYOR ANTHONY SUNDERLAND, of Danbury, Conn., who is also cashier for the Danbury and Bethel Gas and Electric Light Company, is taking a three months course in aviation at the training camp conducted by the Aero Club of America at Ithaca, N. Y. On the eve of his departure for the camp Mayor Sunderland was tendered a banquet by about forty of his friends at the Hotel Green in Danbury.

WILLIAM J. SERRILL,

President-Elect, Illuminating Engineering Society.

WILLIAM J. SERRILL, born November 10, 1862, at Darby, Pa., a suburb of Philadelphia. Graduated University of Pennsylvania, '83 in Mechanical Engineering. Was employed for 2 years with the Southwark Foundry & Machine Company in Philadelphia. In June, 1885, entered the employ of The United Gas Improvement Company, Philadelphia. Since that date has served in various capacities in the Engineering Department of that Company, and is now the Engineer of Appliances. In 1897, when the United Gas Improvement Company leased the Philadelphia Gas Works, he assumed, and still holds, the position of Engineer of Distribution of the Philadelphia Gas Works. He became a member of the Illuminating Engineering Society in January, 1909; served as Chairman of the Philadelphia Section for the season 1910–11; as vice-president, representing the Philadelphia Section of the Council, for the seasons 1912–13 and 1913–14; and as Treasurer of the Society for the season 1911–12.

MR. J. K. SOMERS formerly of Santa Ana, Cal., is now in charge of the Long Beach office of the newly formed Southern Counties Gas Company. The new company formally took over the gas properties of the Southern California Edison Company on June 14, and its first official act was a reduction in rate from $1 to 80 cents per 1,000 cubic feet.

GEN. MORRIS SCHAFF of the Massachusetts Gas and Electric Light Commission, who was on Gen. U. S. Grant's staff in the Civil War, delivered the address at the unveiling of the monument to the students and graduates of Otterbine University, Ohio, who had participated in the War of the Rebellion, at that institution on Thursday June 22. The university conferred upon Gen. Schaff the degree of Doctor of Letters, he having been a student there before entering West Point, where he was a cadet in 1856 and 1857. Gen. Schaff is the author of a number of books treating of several periods of the Civil War.

RALPH W. MENARD, Secretary to the Vice-President of the Boston Consolidated Gas Co., was married June 17 to Miss Merriel Gertrude Willcut, of Cohasset, Mass. Mr. Menard is well known as an amateur actor and is a member of the Criterion Club of players, and many social organizations. The bride is a daughter of the late L. D. Willcut, a Boston contractor.

MR. W. B. MISER formerly manager of the Jacksonville (Ills.) Railway and Light Company, has been appointed Commercial Manager for the controlling company, the McKinley syndicate, with headquarters at Peoria. Ills. Mr. Elmer E. Gray succeeds Mr. Miser at Jacksonville.

H. H. COREY has been appointed a member of the Public Service Commission of Oregon, to fill the vacancy caused by the resignation of C. B. Aitchison, who has become solicitor for the National Association of Railway Commissioners at Washington. Mr. Corey has been for a number of years the Secretary of the Oregon Commission and is well acquainted with its work.

Financial Notes.

THE PEOPLE'S LIGHTING, HEATING & POWER COMPANY of Barre, Vt., has applied to the Vermont Public Service Commission for the right to mortgage its corporate property not to exceed $250,000, and that the net proceeds of the sale of $200,000 thereof to be used to refund its existing 6% first mortgage bonds and also for the right to fund a part of its floating debt and make extensions and improvements to the property. The company also asks the right to increase its capital stock by issuing $50,000 cumulative preferred stock and, incidentally, to change the corporate name to "Barre Gas Company."

The Public Service Commission has set July 20, next, as the date for a hearing on the proposed changes, the hearing to be held in the city court room in Barre.

THE combined net earnings available for dividends of the subsidiary companies of Massachusetts Gas for May were $267,648, an increase of $36,889, or 16%, as compared with the corresponding month of last year.

May: Gas dept.:	1916	1915	1914
Boston	$108,670	101,091	82,028
Quincy	2,690	3,918	452
Newton	2,027	4,192	2,950
East Boston	1,927	4,031	5,439
Totals	$115,314	113,232	91,769
Coal dept.:			
N. E. Gas and Coke	78,098	36,885	75,363
N. E. Coal	62,850	66,543	40,733
Boston Tow	7,552	3,804	6,501
Federal coal	3,383	10,292	4,124
Totals	$152,333	117,526	126,723
Grand totals	267,648	230,759	218,502

THE consolidated statement of profit and loss of the FEDERAL LIGHT & TRACTION COMPANY and its subsidiaries for the years ended December 31, 1914 and 1915 shows for the later period a decrease in gross earnings of $64,945, or 2.7%, and in total income a decrease of $82,354, or 9.3%. The decrease in gross earnings was caused principally by a reduction in gas sales of $21,196; also by a reduction in water sales of $11,744 and by a reduction in railway earnings of $146,356 principally attributable to jitney competition. A consolidated statement of earnings of the company and subsidiaries for the years ended December 31, 1915 and 1914, excluding depreciation, follows:

	1915	1914
*Gross earnings	$2,352,015	$2,416,960
Operating, administrative expenses and taxes	1,545,716	1,528,367
Total income	$806,299	$888,653
Interest charges	589,342	586,155
Central Arkansas Railway & Light Corporation dividend	84,000	84,000
Springfield Railway & Light Company dividend	23,890	.....
Federal Light & Traction Company dividend	.....	112,500
Balance	$109,067	$105,998

*Intercompany earnings, expenses and interest charges have been excluded.

This company has yet to make a reputation as an aggressive advocate of gas lighting.

THE entire outstanding balance of the issue of $3,000,000 6% collateral trust notes of STANDARD GAS & ELECTRIC COMPANY dated June 1, 1913, was paid June 1, 1916, wiping its slate clean of all short term obligations.

Standard's outstanding convertible 6% sinking fund gold bonds, due 1926, are being reduced by $1,911,500 with funds secured from the sale to NORTHERN STATES POWER COMPANY of its holdings of Northern States subsidiaries' bonds at call figures. This brings the present outstanding bond issue down to $7,040,500, which will be further reduced on July 1 through operation of the $58,800 cash now in sinking fund when tenders will be accepted of convertible 6% bonds.

A GAIN of nearly 10% in total business for May, 1916, over May, 1915, is shown in a financial report just made by Public Service Corporation of New Jersey. The increase amounted to $361,250.83. For the five months ending May 31, the total increase in business was nearly $2,000,000, or 13.3% gain over the corresponding period of last year. The report follows:

Month of May, 1916.

Gross increase in total business	$361,250.83
Percentage of increase	11.8%
Balance available—after payment of operating expenses, fixed charges, sinking fund requirements, etc.,—for amortization, dividends and surplus	$400,800.72
Increase in surplus available for dividends over corresponding month, 1915	$48,291.32

The earnings of CITIES SERVICE COMPANY for the period ending May 31, 1916, far exceed all previous records of the company. The gross earnings for the month of May, 1916 were $709,085, an increase of $421,720 as compared with May, 1915. The surplus for dividends was $644,852, a gain of $412,678, and the balance for the common stock $473,497 an increase of $372,156.

Current Prices of Public Utility Securities.

	Bid.	Asked.
American Gas Co	120	122
*American Gas & Electric	146	148
*American Gas & Electric pf	50	52
American Light & Traction	381	386
American Light & Traction pf	110½	112½
American Power & Light	68	69
American Power & Light pf	84	86½
American Public Utilities	45	47
American Public Utilities pf	76	78
Associated Gas & Electric pf	55	65
Atlantic P. & L. pf	92	95
Brooklyn Union Gas Co	125	127
Cities Service	300	325
Cities Service pf	87	88
Colorada Power	24	25
Colorado Power pf	99½	101
*Commonwealth Pr., Ry. & Lt	64½	65
*Commonwealth Pr., Ry. & Lt. pf	84½	86
Consolidated Gas Co	134	135
Denver Gas & Electric gen. 5s	97	99
Electric Bond Deposit pf	85	86
Electric Bond & Share pf	99	100
Federal Light & Traction	11	14
Federal Light & Traction pf	46	50
Gas & Electric Securities	200	...
Gas & Electric Securities pf	97	102
Laclede Gas	106	107
Northern States Power	89	90
Northern States Power pf	97	98
Pacific Gas & Electric	57	58
Pacific Gas & Electric, original	89	90
Pacific Gas & Electric 1st pf	87	88
Public Service	129	130
Republic Ry. & Light Co	35	36
Republic Ry. & Light Co. pf	76	78
*Standard Gas & Electric	15	16
*Standard Gas & Electric pf	40	42
Tennessee Ry., Light & Power	11	12
Tennessee Ry., Light & Power pf	50	51
Toledo Trac., Light & Power	45	47
Toledo Trac., Light & Power pf	82	84
*United Gas Improvement Co	88½	89½
United Light & Railways	52	54
United Light & Railways 1st pf	76	77

*Par value $50

Riter-Conley Manufacturing Company

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GAS METERS

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PREPAYMENT METERS

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PROMPT SHIPMENTS - - - - CORRESPONDENCE SOLICITED

MID-YEAR CONFERENCE PAPERS.

The Executive and Systematic Study by the Employee.

By C. E. Paige.

As Mr. Guernsey said yesterday, "The executives formulate the policies under which companies operate." For years many companies operated under a "closed door" policy which resulted in materially retarding the growth and development of companies. This attitude of ultra-conservatism was particularly true of companies engaged in the gas business.

Fortunately the situation has changed. The gas companies generally realize the need for broader and more open co-operation with their customers—the public. In most cases this change in policy has been wrought, not by the executives themselves, but by their subordinates, particularly the new business managers, who have analyzed situations and recommended remedies.

In other words, executives have been educated up to the value of an aggressive new business policy until they realize that with constantly increasing forces in competition, the gas man must be a more highly trained individual if he is to be a factor in the earning power of his company.

The problem now is—how to procure such training for the employee.

The educational courses offered by the N. C. G. A. undertake a solution.

It is recognized by everyone connected with the industry that any course of study or any effort toward improvement is commendable. Even executives agree to that. But the matter cannot be dropped here.

The tacit approval of an executive is not enough. A group of solicitors cannot accomplish the best results without the example of a new business manager of the right type, neither can a manager put his best effort into a proposition unless the executive is back of him "with a punch."

You who have interested yourselves to come here, know that in practically all communities the gas send-out or gross income, or whatever unit may be used to cheer or discourage the executive, has not shown up so well in the last year as it should. You know that to restore the smile to his countenance you must increase gas sales. To do this you must have trained salesmen, not order-takers. The facilities are in your hands, the executive must acknowledge the force of your argument.

Raw materials are increasing in price; so is labor. Oil, a competitor in industrial lines, costs gas companies more money, but your prospect is also paying more money for it while the price of your product remains the same. Here is the golden opportunity. The supply of trained gas appliance salesmen, whether for domestic or industrial apparatus, is painfully inadequate. To get trained men we must make them. The appliance manufacturers have no small part to play in shaping the attitude of the executive. Their efforts will be repaid.

The N. C. G. A. course offers a method by which this result may be accomplished. A right minded enthusiastic executive may be brought to see it by the combined efforts of the members here, the appliance salesman and this Association itself.

Overcoming the Physical Objections to Study.

By G. W. Allen.

Most men seem to take a great delight in discovering some kind of objection to studying. The natural man seems to be a lazy creature at the best, and he does not like anything that comes as a hindrance to his progress. Especially is this true when he is told to knuckle down to study for the sake of results which are still in the future.

"How to overcome the physical objections to studying" includes many considerations and especially those which deal with the varied temperaments of men. I shall endeavor to point out some means for overcoming the following physical objections to study which men are apt to allege.

1st.—Too far to travel.
2nd.—Too tired.
3rd.—No time; too many social engagements.
4th.—No place for class meetings.
5th.—Family cares.
6th.—Too small an income, etc.

I believe if a man told me that it was "too far to travel" to class meetings, I would bring out some points relative to the fact that success is only gained by sacrifice of some kind. If we really desire to make a success of our chosen profession, we will not consider distance as an almost insurmountable obstacle. The quotation "Where the treasure is the heart will be also," might be appropriate in a case like this. I believe class leaders and educational directors should so endeavor to bring out the great advantages resulting from study, and also make the meetings so interesting that when the men get there, they feel that the distance is not to be considered at all.

2. "Too tired" is one of the many objections brought out by some men who want to get out of studying, nor is it an easy objection to overcome. I know from personal experience that tiredness after a day's work is in part at least the result of uninteresting employment. A man who is heartily interested in his work escapes much of that feeling of excessive weariness. The "too tired" expression would rapidly disappear if the study courses were outlined with an eye to systematizing and rendering interesting a man's work both in shop and in class. It might also be a good plan to co-operate with him in some way whereby he will be assisted to get on with his studying. Gas men who are objecting constantly to study are not worth much at best, and it might be well worth while to spend our time only on the men who desire to get along.

3. The man who says "he has no time," because he has too many "social engagements" is also a man who might as well be dropped because it would be a hard thing to get him to regulate his work for studying purposes. Of course, a man of this type has to be handled very carefully and made to see that it is to his own interest to systematize activities along social and study lines. He should have certain times for social pleasures and certain times for studying. It is up to the man who offers educational courses to get him to see this and to persuade him to arrange work in a manner that will mean both profit and pleasure to him.

The busy man is usually the happier man, and as some one has said, is the *best* man to go to whenever you want anything done.

4. A plan worth considering is to have a meeting of all gas men who are interested in the courses, in one of the company's salesrooms or board rooms, shortly after the day's work is done, and to ask the students whether it would be possible for them to co-operate by holding class meetings at their homes in turn.

5. The "family cares" objection is also a difficult one to solve and in most cases is an objection given by men who are always in trouble, fancied or real. My investigations surrounding the home life of men who have given me this objection have convinced me that in most cases they actually do have family cares, but these same cares are often brought about through unsystematic arrangement of the work in their homes. Teach a man the first step in applied household economics, which is the conservation of time and strength in the industrial centers of his home, and he will find out that he has a great deal more time for other purposes than he would ever have imagined. Often we find a man's home to be anything but a picture of systematic regulation. When we look about us and see the offices of most successful business men, we find them models of compactness. A kitchen in a dining car gives us another glimpse of condensed convenience. The dentist's office and the carpenter's shop all point to the fact that men have made greater progress in their business establishments than they have in their homes. I believe family cares often result from not taking sufficient time to think out plans for regulating the time and work in the home. A man with sickness in his home, and the heavy expense resulting from it, can not be expected to do much studying or put much time or thought into such work. I believe that teaching a man to systematize his day's work, his habits, and his time, will result in his taking a greater interest in the studying question.

6. The man who says he has "too small an income" to allow of his taking up much studying, is a man well worth analyzing to find out how he actually does spend what money he gets. It is surprising how much information a man of this class will give you if you take him up in a sociable and friendly way.

If he really believes that you are endeavoring to help him manage on his small income, and to have some left over for self improvement, he will give you information which will be of value. But above all things take a hearty interest in every man's welfare and in return you will receive an abundant reward.